

Appl. No. : 10/078,283
Filed : February 14, 2002

AMENDMENTS TO THE CLAIMS

1. – 3. (Canceled)

4. (Currently Amended) The multilumen catheter of Claim ~~[[1]]~~6 wherein the redirecting tip comprises a J-tip.

5. (Canceled)

6. (Previously Presented) A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising:

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen extending between said first distal end and said proximal end adapted to fluidly communicate with the patient;

a second lumen extending between said second distal end and said proximal end adapted to fluidly communicate with the body independently of the first lumen; and

a redirecting tip positioned at the distal end of one of the lumens and configured to redirect substantially all of the blood flow exiting said lumen in a direction generally opposite of the direction of flow in the lumen;

wherein the second lumen is positioned coaxially with the first lumen and has a diameter greater than the first lumen.

7. (Previously Presented) A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising:

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

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a first lumen extending between said first distal end and said proximal end adapted to fluidly communicate with the patient;

a second lumen extending between said second distal end and said proximal end adapted to fluidly communicate with the body independently of the first lumen; and

a third lumen in fluid communication with the second lumen, said second and third lumens being positioned radially around the first lumen in a housing that surrounds said first lumen, the combined cross-sectional area of said second and third lumens being not substantially different from the cross-sectional area of said first lumen.

8. (Previously Presented) A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising:

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen extending between said first distal end and said proximal end adapted to fluidly communicate with the patient;

a second lumen extending between said second distal end and said proximal end adapted to fluidly communicate with the body independently of the first lumen;

a third lumen in fluid communication with the second lumen, said second and third lumens being positioned radially around the first lumen in a housing that surrounds said first lumen; and

a fourth lumen in fluid communication with the second and third lumens, said second, third and fourth lumens being positioned symmetrically radially around the first lumen in a housing that surrounds said first, the combined cross-sectional area of said second, third, and fourth lumens being not substantially different from the cross-sectional area of said first lumen.

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9. (Previously Presented) A method of using the multilumen catheter of Claim 6 comprising the step of directing the catheter through a patient's vasculature, thereby permitting a user to draw blood through the second lumen and redirect said blood into the first lumen.

10. – 18. (Canceled)

19. (Currently Amended) The multilumen catheter of Claim [[1]]6, wherein the redirecting tip further comprises a surface positioned at the distal end of and within one of the first and the second lumens, the surface configured to redirect substantially all of the blood flow exiting the lumen in a direction generally opposite of the direction of flow in the lumen.

20. (Previously Presented) The multilumen catheter of Claim 19, wherein the redirecting tip is positioned at the distal end of the first lumen.

21. (Previously Presented) The multilumen catheter of Claim 20, wherein the surface extends across the first lumen between a side of the lumen and a longitudinal axis of the first lumen.

22. (Previously Presented) The multilumen catheter of Claim 19, wherein the surface substantially prevents blood from flowing beyond the surface in the lumen in which the surface is positioned.

23. (Previously Presented) The multilumen catheter of any of Claim 19, wherein the lumen in which the surface is positioned has a closed distal end.

24. (Currently Amended) ~~The multilumen catheter of Claim 19, A multilumen catheter for directing the flow of blood through a patient through a single cannulation site, said catheter comprising~~

a catheter body having a proximal end, a first distal end, and a second distal end, said first distal end extending distally farther from the proximal end than the second distal end;

a first lumen having a first cross-sectional area and extending between said first distal end and said proximal end;

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a second lumen extending between said second distal end and said proximal end and having a second cross-sectional area that is not substantially larger than the first cross-sectional area; and

a redirecting tip positioned at the distal end of one of the lumens and configured to redirect substantially all of the blood flow exiting said lumen in a direction generally opposite of the direction of flow in the lumen;

wherein the redirecting tip further comprises a surface positioned at the distal end of and within one of the first and the second lumens, the surface configured to redirect substantially all of the blood flow exiting the lumen in a direction generally opposite of the direction of flow in the lumen; and

wherein the redirecting tip comprises a distal end having a generally hemispherical shape.

25. (Previously Presented) The multilumen catheter of Claims 19, wherein the redirecting tip comprises a distal end having a generally parabolic profile.

26. (Previously Presented) The multilumen catheter of Claim 19, further comprising a plurality of outlets in the side of the lumen wherein the surface is located.

27. (Previously Presented) The multilumen catheter of Claim 26, where at least three outlets are provided in a side of the lumen wherein the surface is located.

28. (Previously Presented) The multilumen catheter of Claim 26, wherein the outlets have a generally rectangular shape.

29. (Previously Presented) The multilumen catheter of Claim 26, wherein a member extends between the catheter body and the redirecting tip between two adjacent outlets.

30. (Previously Presented) The multilumen catheter of Claim 19, wherein the cross-sectional profile of the surface is substantially parabolic.

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31. **(Previously Presented)** The multilumen catheter of Claim 19, further comprising a radiopaque marker.

32. – 33. **(Canceled)**

34. **(Previously Presented)** A method of using the multilumen catheter of Claim 7, comprising the step of directing the catheter through a patient's vasculature, thereby permitting a user to draw blood through at least one of the second lumen and the third lumen and direct said blood into the first lumen.

35. **(Previously Presented)** A method of using the multilumen catheter of Claim 8, comprising the step of directing the catheter through a patient's vasculature, thereby permitting a user to draw blood through at least one of the second lumen, the third lumen, and the fourth lumen and direct said blood into the first lumen.

36. **(New)** The multilumen catheter of Claim 6, wherein the first lumen has a first cross-sectional area and the second lumen has a second cross-sectional area that is substantially equal to or less than the first cross-sectional area.

37. **(New)** The multilumen catheter of Claim 6, wherein the redirecting tip has a low-profile configuration enabling insertion through a small incision and a deployed configuration in which at least a portion of the redirecting tip is displaced relative to the low-profile configuration, the deployed configuration enabling substantially all of the blood flowing in the lumen to be directed back along the catheter body.

38. **(New)** The multilumen catheter of Claim 37, wherein the redirecting tip is substantially straight when the redirecting tip is in the low-profile configuration.

39. **(New)** The multilumen catheter of Claim 37, wherein the redirecting tip further comprises a tapered tip that is the distal most structure of the multilumen catheter when the redirecting tip is in the low-profile configuration.

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40. (New) The multilumen catheter of Claim 4, wherein the J-tip is curved such that blood exiting the lumen with which the redirecting tip is coupled is directed back along the catheter body.

41. (New) The multilumen catheter of Claim 40, wherein the J-tip is pre-loaded to maintain a curved shape.

42. (New) The multilumen catheter of Claim 41, further comprising a coil configured to pre-load the J-tip.

43. (New) The multilumen catheter of Claim 41, further comprising a wire reinforcement configured to pre-load the J-tip.

44. (New) The multilumen catheter of Claim 41, further comprising a shape memory material configured to pre-load the J-tip.

45. (New) The multilumen catheter of Claim 4, further comprising at least one distal aperture formed at the bend of the J-tip, the aperture configured to permit blood to flow out of the lumen with which the J-tip is coupled distally of the catheter body.